REMARKS

I. Introduction

Claims 1, 2, 4-12, 14-21, and 24 are pending in this application, of which claims 1, 11, and 24 are independent. In this Amendment, claims 1, 2, 11, 12, 15, and 24 have been amended, and new claims 25 and 26 have been added. Care has been exercised to avoid the introduction of new matter. Support for the amendment of claims 1 and 11, and new claims 25 and 26 can be found on, for example, page 18, line 2 to page 19, line 15; and page 27, lines 15-19 of the specification. Claims 2 and 12 have been amended to delete the limitation "each of the plurality of pieces is a tubular member." Claim 15 has been amended to be dependent on claim 11. Support for the amendment of claim 24 can be found on, for example, page 17, line 23 to page 18, line 9 of the specification.

II. The Objection to Claim 24

An objection has been made to claim 24 because of a typographical error. In response, claim 24 has been amended to correct the error in the manner suggested by the Examiner. Withdrawal of the objection to claim 24 is, therefore, respectfully solicited.

III. The Rejection of Claims 1, 2, 4-12 and 14-21 under 35 U.S.C. §112, second paragraph

The Examiner asserted, "the recitation in independent claims 1 and 11 of 'a plurality of pieces formed in relation to a distribution of temperatures in the... chamber during the plasma processing,' and the recitation that 'each of the plurality of pieces is shorter in axial length than a

piece disposed at a location where a gradient of the temperatures at the time of the plasma processing is smaller' render the claims indefinite" (paragraph 4 of the Office Action).

Although Applicants disagree to the Examiner's position, to expedite prosecution of the present application, Applicants have amended independent claims 1 and 11 to delete the limitations identified by the Examiner, rendering the 112 rejection moot. Accordingly, Applicants respectfully solicit withdrawal of the rejection of claims 1, 2, 4-12 and 14-21 under 35 U.S.C. §112, second paragraph.

IV. The Rejection of Claims 1, 2, 6-8, and 24 under 35 U.S.C. §103(a)

Claims 1, 2, 6-8, and 24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Applicants' Admitted Prior Art (AAPA) in view of Carpenter et al.. Claims 1 and 24 are independent.

In the statement of the rejection, the Examiner admitted that the AAPA does not expressly teach the protection tube composed of a plurality of pieces. However, the Examiner asserted that Carpenter et al. teaches the missing feature of the AAPA, and concluded that it would have been obvious to modify the AAPA based on the teachings of Carpenter et al.. Even assuming *arguendo* proper, it is respectfully submitted that the proposed combination does not disclose or suggest each and every limitations of claim 1.

Claim 1 recites, in pertinent part, the following limitations:

> the protection tube is inserted in the plasma chamber and comprises a plurality of pieces disposed in an axial direction of the protection tube, and
>
> one of the plurality of pieces is shorter in axial length than another piece disposed farther from the sample chamber than said one of the plurality of pieces.

Turning to the prior art, the AAPA does not teach the claimed protection tube comprising a plurality of pieces as admitted by the Examiner. Further, Carpenter et al. does not teach, at a minimum, "one of the plurality of pieces is shorter in axial length than another piece disposed farther from the sample chamber than said one of the plurality of pieces," recited in claim 1. Carpenter et al. is directed to a semiconductor substrate deposition chamber (see, e.g., column 1, lines 8-12), in which pieces of liner apparatus 30 are disposed as shown in, for example, Fig. 2. The pieces of liner apparatus 30 are alleged to correspond to the claimed pieces of the protection tube according to the Examiner.

However, Carpenter et al. does not teach, at a minimum, a positional relationship between the plurality of pieces and the sample chamber because Carpenter et al. does not teach the claimed plasma and sample chambers. In fact, Carpenter et al. discloses a semiconductor substrate deposition chamber. Accordingly, the pieces of liner apparatus 30 disposed in semiconductor substrate deposition chamber 18 do not teach, "one of the plurality of pieces is shorter in axial length than another piece disposed farther from the sample chamber than said one of the plurality of pieces," recited in claim 1 (emphasis added). Indeed, Carpenter et al. is silent on the positional relationship between the plurality of pieces and the sample chamber.

Accordingly, the AAPA and Carpenter et al., either individually or in combination, do not teach a plasma processing apparatus including, at a minimum, "one of the plurality of pieces is shorter in axial length than another piece disposed farther from the sample chamber than said one of the plurality of pieces," as recited in claim 1. Dependent claims 2 and 6-8 are also patentably distinguishable over the AAPA and Carpenter et al. at least because these claims include all the limitations recited in independent claim 1.

According to one aspect of the present invention, the protection tube can be configured to allow for thermal expansion resulting from a large temperature difference between the plasma and sample chambers. Thus, the internal stress applied to the protection tube as a result of thermal expansion can be reduced. As a consequence, breakage of the protection tube and flaking of deposited products can be prevented. Accordingly, it may not be necessary to replace protection tubes as frequently as conventionally required. With the those advantages, costs required for protection tube replacement can be reduced, and changes in plasma processing characteristics resulting from protection tube replacement can be avoided as much as possible. These advantages obtained from the claimed plasma processing apparatus may not be taught by the combination of the AAPA and Carpenter et al..

With respect to independent claim 24, the Examiner admitted that the applied combination of the AAPA and Carpenter et al. does not expressly teach how the plurality of pieces of the protection tube are coupled to each other. However, the Examiner asserted that Carpenter et al. additionally teaches that the plurality of pieces of protection tube 30 can be coupled with each other through tongue and groove interconnections, and concluded that the applied combination can further be modified to arrive at the claimed invention based on teachings of Carpenter et al.. Even assuming *arguendo* proper, it is respectfully submitted that the proposed combination does not disclose or suggest each and every limitations of claim 24.

Claim 24 recites, in pertinent part, "at least one of the plurality of pieces has an end portion that is wider in inside diameter and an end portion of another one of the plurality of pieces that is coupled to the wider inside diameter portion is narrower in outside diameter."

Turning to the prior art, the AAPA does not teach the claimed protection tube comprising a plurality of pieces as admitted by the Examiner. Although Carpenter et al. purportedly teaches

that the pieces of liner apparatus 30 are coupled with each other via tongue and groove interconnection according to the Examiner, such connection does not teach, at a minimum, "at least one of the plurality of pieces has an end portion that is wider in inside diameter and an end portion of another one of the plurality of pieces that is coupled to the wider inside diameter portion is narrower in outside diameter," recited in claim 24 (emphasis added). Indeed, Carpenter et al. is silent on a dimensional relationship between pieces of the protection tube. Accordingly, the AAPA and Carpenter et al., either individually or in combination, do not teach a plasma processing apparatus including all the limitations recited in independent claim 24.

According to one aspect of the present invention, it can be made possible to allow each piece to be freely expanded when it is subjected to heat generated during plasma processing. Thus, the internal stress applied to the protection tube as a result of thermal expansion can be reduced. As a consequence, breakage of the protection tube and flaking of deposited products can be prevented. Accordingly, it may not be necessary to replace protection tubes as frequently as conventionally required. With the above advantages, costs required for protection tube replacement can be reduced, and changes in plasma processing characteristics resulting from protection tube replacement can be avoided as much as possible.

Based on the foregoing, Applicants submit that the applied combination of the AAPA and Carpenter et al. does not teach a plasma processing apparatus including all the limitations recited in claims 1, 2, 6-8, and 24. Applicants, therefore, respectfully solicit withdrawal of the rejection of the claims under 35 U.S.C. §103 and favorable consideration thereof.

V. The Rejection of Claims 4 and 5 under 35 U.S.C. §103(a)

Claims 4 and 5 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the AAPA in view of Carpenter et al. and further in view of Carducci et al..

Claims 4 and 6 depend from independent claim 1. Applicants incorporate herein the arguments previously advanced in responding to the rejection of claim 1 under 35 U.S.C. §103 for obviousness predicated upon the AAPA and Carpenter et al.. The Examiner's additional comments and secondary reference to Carducci et al. do not cure the previously argued deficiencies in the applied combination of the AAPA and Carpenter et al..

Applicants, therefore, submit the applied combination of the AAPA, Carpenter et al., and Carducci et al. does not teach a plasma processing apparatus including all the limitations recited in claims 4 and 6. Withdrawal of the rejection of the claims is respectfully solicited.

VI. The Rejection of Claims 9-12 and 16-21 under 35 U.S.C. §103(a)

Claims 9-12 and 16-21 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the AAPA in view of Carpenter et al., and further in view of Kennedy et al..

With respect to independent claim 11, Applicants incorporate herein the arguments previously advanced in responding to the rejection of claim 1 under 35 U.S.C. §103 for obviousness predicated upon the AAPA and Carpenter et al. because claim 11 also recites, among other things, "one of the plurality of pieces is shorter in axial length than another piece disposed farther from the plasma chamber than said one of the plurality of pieces." The Examiner's additional comments and reference to Kennedy et al. do not cure the previously argued deficiencies in the applied combination of the AAPA and Carpenter et al.. Kennedy et al. simply teaches a plasma processing chamber including a ceramic liner which is purportedly

identified as the claimed protection tube. As admitted by the Examiner, the ceramic liner is not composed of a plurality of pieces. Accordingly, Kennedy et al. does not teach, at a minimum, a positional relationship between the plurality of pieces and the sample chamber, as claimed.

Therefore, the AAPA, Carpenter et al., and Kennedy et al., either individually or in combination, do not teach a plasma processing apparatus including, at a minimum, "one of the plurality of pieces is shorter in axial length than another piece disposed farther from the plasma chamber than said one of the plurality of pieces," as recited in independent claim 11. Dependent claims 12 and 16-21 are also patentably distinguishable over the AAPA, Carpenter et al., and Kennedy et al. at least because these claims include all the limitations recited in independent claim 11.

Regarding claims 9 and 10 depending from independent claim 1, Applicants also incorporate herein the arguments previously advanced in responding to the rejection of claim 1 under 35 U.S.C. §103 for obviousness predicated upon the AAPA and Carpenter et al.. The Examiner's additional comments and secondary reference to Kennedy et al. do not cure the previously argued deficiencies in the applied combination of the AAPA and Carpenter et al..

Based on the foregoing, the AAPA, Carpenter et al., and Kennedy et al., either individually or in combination, do not teach a plasma processing apparatus including all the limitations recited in claims 9-12 and 16-21. Applicants, therefore, respectfully solicit withdrawal of the rejection of the claims under 35 U.S.C. §103 and favorable consideration thereof.

VII. The Rejection of Claims 14 and 15 under 35 U.S.C. §103(a)

Claims 14 and 15 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the AAPA in view of Carpenter et al., and further in view of Kennedy et al., and further in view of Carducci et al..

Claims 14 and 15 depend from independent claim 11. Applicants incorporate herein the arguments previously advanced in responding to the rejection of claim 11 under 35 U.S.C. §103 for obviousness predicated upon the AAPA, Carpenter et al., and Kennedy et al.. The Examiner's additional comments and reference to Carducci et al. do not cure the previously argued deficiencies in the applied combination of the AAPA, Carpenter et al., and Kennedy et al..

Applicants, therefore, submit the applied combination of the AAPA, Carpenter et al., Kennedy et al., and Carducci et al. does not teach a plasma processing apparatus including all the limitations recited in claims 14 and 15. Withdrawal of the rejection of the claims is respectfully solicited.

VIII. New Claims 25 and 26

Applicants believes that the AAPA, Carpenter et al., Kennedy et al., and Carducci et al., either individually or in combination, do not disclose or teach a plasma processing apparatus including all the limitations recited in claims 25 and 26. Specifically, as set forth above, the references do not disclose or teach, at a minimum, a positional relationship between the plurality of pieces and the sample chamber or the plasma chamber, as claimed. Applicants, therefore, respectfully solicit favorable consideration thereof.

X. Conclusion

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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